

**APPENDIX**

The amended paragraph of the specification at page 20 shown above has been amended to change the justification from full justification to left justification, in order to correct the formatting problem identified by the Examiner. A photocopy of the specification page 20 is attached with the corrected formatting circled.

**The amended paragraph at page 73 has been amended as follows:**

Silane 2: 5-10% v/v of an isopropyl alcohol solution containing 50% trimethoxysilylpropyl modified [polyethyleneimene] polyethyleneimine.

**The amended claims shown above have been amended as follows:**

1. (Amended) A process for treating a metal substrate to improve adhesion of polymeric materials thereto, comprising the steps of  
intergranular etching a surface of the metal substrate; and  
applying an immersion plated metal to the intergranular etched surface by immersing the surface in an immersion plating composition comprising one or more plating metals selected from tin, silver, bismuth, copper, nickel, lead, zinc, indium, palladium, platinum, gold, cadmium, ruthenium, cobalt, gallium and germanium.  
wherein the step of intergranular etching is carried out with an intergranular etching composition selected from the group consisting of:

(1) an intergranular etching composition comprising

an oxidizer;

a mineral acid, an alkyl sulfonic acid or fluoroboric acid or a mixture

thereof:

a corrosion inhibitor; and

a source of halide ions; or

(2) an intergranular etching composition comprising

0.1 to 20% by weight hydrogen peroxide,

an inorganic acid,

an organic corrosion inhibitor and

a surfactant; or

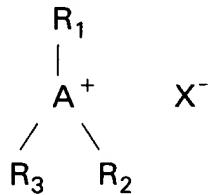
(3) an intergranular etching composition comprising

(a) hydrogen peroxide;

(b) at least one acid;

(c) at least one nitrogen-containing, five-membered heterocyclic compound which does not contain any sulphur, selenium or tellurium atom in the heterocycle; and

(d) at least one adhesive compound selected from sulfinic acids, seleninic acids, tellurinic acids, heterocyclic compounds containing at least one selenium and/or tellurium atom in the heterocycle, and sulfonium, selenonium and telluronium salts having the general formula (A),



in which

A stands for S, Se or Te;

R<sub>1</sub>, R<sub>2</sub> and R<sub>3</sub> stand for alkyl, substituted alkyl, alkenyl, phenyl, substituted phenyl, benzyl, cycloalkyl, substituted cycloalkyl, R<sub>1</sub>, R<sub>2</sub> and R<sub>3</sub> being the same or different; and

X<sup>-</sup> stands for an anion of an inorganic or organic acid or hydroxide, provided that the acid selected to constitute component (b) is not identical to the sulfinic, seleninic or tellurinic acids selected as component (d); or

(4) an intergranular etching composition comprising

0.5 to 5% w/v hydrogen peroxide; and

0.01 to 5% w/v of an aromatic sulfonic acid or a salt thereof, or

(5) an intergranular etching composition comprising:

(a) an acid,

(b) a copper complexing agent selected from the group consisting of urea compounds, thiourea compounds, amidines, imidazole thiones, 2,4-dithiobis(2,6-trithiotriuret, alkoxy ethers of isothiourea, thiocyanuric acid, and thioammelide,

(c) a metal selected from the group consisting of tin, bismuth, lead and cerium, which is present in one of its higher positive oxidation states and which metal forms a composition soluble salt, and

(d) oxygen,

wherein the concentration of the higher positive oxidation state metal in the composition is greater than about 4 grams per liter of the composition.

2. (Amended) The process of claim 1, wherein the intergranular etched surface comprises intergranular crevices having an aspect ratio of [at least] about 1 or greater.

3. (Amended) The process of claim 1, wherein the intergranular etched surface comprises intergranular crevices having an aspect ratio of [at least] about 2 or greater.

4. (Amended) The process of claim 1, wherein the intergranular etched surface comprises intergranular crevices having a depth of [at least] about 1 micron or greater.

9. (Amended) [The process of claim 5, wherein said] A process for treating a metal substrate to improve adhesion of polymeric materials thereto, comprising the steps of

intergranular etching a surface of the metal substrate; and  
applying an immersion plated metal to the intergranular etched surface by immersing the surface in an immersion plating composition comprising one or more plating metals selected from tin, silver, bismuth, copper, nickel, lead, zinc, indium, palladium, platinum, gold, cadmium, ruthenium, cobalt, gallium and germanium  
wherein, when the intergranular etched surface is divided into a grid of squares 10 microns on each side, at least 50% of the squares include at least one intergranular crevice having an aspect ratio of at least 5.

14. (Amended) The process of claim 13, wherein the aqueous solution of a silane comprises [a solution of] about 0.5 wt% to about 3 wt% of [a silane selected from] one or more of diethoxymethylsilylpropyltriethoxysilane, tris (triethoxysilylpropyl) amine, a trimethoxy silyl propyl modified [polyethylene amine] polyethyleneimine, and a mixture of  $\gamma$ -ureidopropyltriethoxysilane and bis(triethoxysilyl) ethane.

19. (Amended) The process of claim 1, wherein the step of applying an immersion plated metal is carried out [by passing the metal substrate through the immersion plating composition] on a continuous basis.

25. (Amended) The process of claim 10 wherein the polymeric nonconductive material is one or more of PTFE, an epoxy resin, a polyimide, a polycyanate ester, a butadiene terephthalate resin[, or mixtures thereof].

27. (Amended) The process of claim 13 wherein the silane comprises a trimethoxysilylpropyl modified [polyethylene amine] polyethyleneimine.

32. (Amended) The process of claim 1, wherein the step of intergranular etching is carried out with the [an] intergranular etching composition (1) [comprising  
an oxidizer;  
an acid;

a corrosion inhibitor; and  
a source of halide ions].

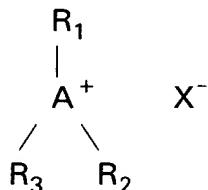
38. (Amended) The process of claim 1, wherein the step of intergranular etching is carried out with the [an] intergranular etching composition (2) [comprising 0.1 to 20% by weight hydrogen peroxide,  
an inorganic acid,  
an organic corrosion inhibitor and  
a surfactant].

42. (Amended) The process of claim 1, wherein the step of intergranular etching is carried out with the [an] intergranular etching composition (3) [comprising

- (a) hydrogen peroxide;
- (b) at least one acid;

(c) at least one nitrogen-containing, five-membered heterocyclic compound which does not contain any sulphur, selenium or tellurium atom in the heterocycle; and

(d) at least one adhesive compound selected from sulfinic acids, seleninic acids, tellurinic acids, heterocyclic compounds containing at least one sulphur, selenium and/or tellurium atom in the heterocycle, and sulfonium, selenonium and telluronium salts having the general formula (A),



in which

A stands for S, Se or Te;

R<sub>1</sub>, R<sub>2</sub> and R<sub>3</sub> stand for alkyl, substituted alkyl, alkenyl, phenyl, substituted phenyl, benzyl, cycloalkyl, substituted cycloalkyl, R<sub>1</sub>, R<sub>2</sub> and R<sub>3</sub> being the same or different; and

X<sup>-</sup> stands for an anion of an inorganic or organic acid or hydroxide, provided that the acid selected to constitute component (b) is not identical to the sulfinic, seleninic or tellurinic acids selected as component (d)].

49. (Amended) The process of claim 1, wherein the step of intergranular etching is carried out with the [an] intergranular etching composition (4) [comprising 0.5 to 5% w/v hydrogen peroxide; and

0.01 to 5% w/v of an aromatic sulfonic acid or a salt thereof].

53. (Amended) The process of claim 1, wherein the step of intergranular etching is carried out with the [an] intergranular etching composition (5) [comprising:

- (a) an acid,
- (b) a copper complexing agent,
- (c) a metal capable of having a multiplicity of oxidation states which is present in one of its higher positive oxidation states and which metal forms a composition soluble salt, and
- (d) oxygen,

wherein the concentration of the higher positive oxidation state metal in the composition is greater than about 4 grams per liter of composition].

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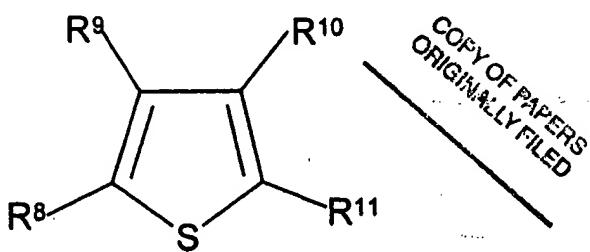
wherein R<sub>4</sub>, R<sub>5</sub> and R<sub>6</sub> = H, alkyl, substituted alkyl, phenyl, substituted phenyl, R<sub>7</sub>-(CO)- with R<sub>7</sub> = H, alkyl, substituted alkyl, phenyl, substituted phenyl, wherein R<sub>4</sub>, R<sub>5</sub> and R<sub>6</sub> may be the same or different.

5 In one embodiment, component (d) is formamidine sulfonic acid.

In one embodiment of the heterocyclic/adhesive intergranular etching composition, component (d) comprises one or more heterocyclic compounds selected from thiophenes, thiazoles, isothiazoles, thiadiazoles and thiatriazoles. In another embodiment, component (d) comprises one or more sulfonic acid compounds selected from benzene sulfonic acid, toluene sulfonic acid, chlorobenzene sulfonic acid, nitrobenzene sulfonic acid and carboxybenzene sulfonic acid. In another embodiment, component (d) comprises one or more sulfonium salts selected from trimethyl sulfonium salts, triphenyl sulfonium salts, methioninealkyl sulfonium salts, and methionine benzylsulfonium salts.

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In one embodiment of the heterocyclic/adhesive intergranular etching composition, component (d) is a thiophene compound having the chemical formula:



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20 wherein R<sup>8</sup>, R<sup>9</sup>, R<sup>10</sup> and R<sup>11</sup> may be hydrogen, alkyl, substituted alkyl, phenyl, substituted phenyl, halogen, amino, alkylamino, dialkylamino, hydroxy, alkoxy, carboxy, carboxyalkyl, alkoxycarbonyl, aminocarbonyl, R<sup>12</sup>-CONH- wherein R<sup>12</sup> may be hydrogen, alkyl, substituted alkyl, phenyl, substituted phenyl, whereby R<sup>8</sup>, R<sup>9</sup>, R<sup>10</sup> and R<sup>11</sup> may be the same or

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